INSECT CONTROL METHODS

William A. Bland, Sr., North Carolina Forest Service

Dr. LeRoy Jones called and asked me to demonstrate the North Carolina Thimet applicator as a part of this program. When the program listed me for "Insect Control Methods," I was somewhat stunned. As nursery and tree improvement personnel, we all work with control of pests, but I am certainly no authority on this broad and complex subject.

We have had some experience with the application of Thimet and in cooperation with the U. S. Forest Service, Southeastern Area, State and Private Forestry, Division of Forest Pest Control, a pilot test was established in 4-year-old loblolly pine (1968). Three dosage rates of phorate (40, 80, and 100 grams per tree) were applied in early-March. The granular Thimet was applied around the base of the tree. Mulch was raked away before application and replaced after treatment. A 1 percent DDT application was replicated on a representative number of trees at monthly intervals from March to September to serve as the standard check. The four experimental treatments were replicated four times each under normal environmental conditions and under controlled moisture conditions (irrigated). Soil moisture meters placed in the irrigated and non-irrigated areas were read every third or fourth day. The irrigated area was maintained at soil moisture capacity throughout the test.

Field evaluations were conducted in May, July, and September 1968. Each tree was examined and the height, clone, treatment, species, and number of tip moth infested tips in the 20 uppermost branch ends were recorded.

The field data, collected in July and September from the seed orchard where high tip moth populations existed, were analyzed in three separate ways for each collection date.

1. The tree was taken as a basic unit of observation and classified as infested or non-infested.

2. Basic observation consisted of percent infestation. Data from all trees on a plot was pooled for analyzing.

3. The third analysis method assumed that the variation in infestation proneness from tree to tree was so large that the effect due to differences in the number of tips observed on each tree was negligible. In this case, the percent infestation of a given plot is the unweighted average of the infestation percents of each of the trees within the plot.

RESIDUE ANALYSIS

In July and again in September, approximately 2 pounds of distal 6-inch pine tips were removed from each of six trees (the same trees each time). The sample trees were 6 feet + 1 inch in height, of the same clone, and representative of the three phorate treatments in the irrigated and non-irrigated replicates,

The samples were analyzed in the laboratory for toxic metabolites of phorate. Pine tips from nearby untreated trees were also analyzed for use as standards. In this way, the existence, relative amounts in parts per million, and variation in concentration of toxic residues were established.

Results.--High levels of tip moth activity in the seed orchard facilitated the collection of highly pertinent data in July and September. This data was used for statistical analysis and statements of conclusion.

All three methods of analysis indicated a decided superiority of phorate over monthly applications of DDT to control tip moth.

Overall, the number of total tips infested in the DDT treatment was 11 times greater than the number of infested tips in the lowest phorate dosage per tree tested. As the phorate dosage increases, the number and percent of infested tips decrease correspondingly.

Although tip moth populations tend to build up toward the end of the season, the higher (80 and 100 grams per tree) dosage levels of phorate succeeded in reducing the presumably larger September populations below that recorded in July. Even though tip moth tended to increase at the lowest treatment (40 grams per tree), damage was held to a tolerable level.

Although there was no statistical difference among the three treatments in July, the 100-gram per tree treatment was shown to be

significantly more effective than the 40-gram per tree treatment in September. One method of analysis indicated that the 80-gram per tree treatment was more effective than 40 grams per tree.

None of the analyses provided evidence of any effect due to irrigation or an irrigation-insecticide interaction. But as the level of phorate increased, surplus water seemingly became less important. Rainfall of 20.14 inches over the 7-month test period was adequate to carry the systemic insecticide into the soil for uptake by the tree root system.

Phorate residues increased as dosage rate per tree increased. Residue levels under irrigated and non-irrigated conditions were variable. The variations which occurred substantiate that there was no significant difference between irrigated and non-irrigated treatments.

Generally, the parts per million phorate residue remained high at all dosage levels through the conclusion of the test. This possibly is the reason for the over-all continuation of control in phorate-treated trees through the conclusion of the pilot test. It also suggested the possibility of control extending into the next year (1969),

This proved to be true. At the 100-gram per tree rate, the phorate level in 1969 remained as high as the 40- and 80-gram per tree rates shown in July and September of 1968. In fact, no additional Thimet was added in 1969, and tip moth control remained good.

Credit for this study must be given to the following men: J. L. Rauschenberger, T. H. Flavell, W. H. Clerke, all entomologists, Division of Pest Control, Southeastern Area, State and Private Forestry, Asheville, North Carolina; and C. R. Grady, Pest Control Staff Forester, North Carolina Forest Service.

Needless to say, we are using Thimet as a regular application for tip moth control in our seed orchards. To facilitate safety and accuracy of application, our tree improvement personnel have developed a hand applicator.

The applicator consists of a reservoir made from the body of a 3-gallon garden sprayer joined to a valve system consisting of two modified gate-type water valves connected by a length of clear plastic tubing and a control lever. The lever is constructed so that when it is released, the rear gate valve is open and the front gate valve is closed. When the lever is pressed down, the rear gate valve is closed and the front valve is open.

To use the applicator, the reservoir is filled with Thimet. The operator, dressed in protective clothing, walks to the tree and presses down on the lever. This releases a measured amount of phorate. He then releases the lever. This allows another measured amount of material to descent while he walks to the next tree.

Illustrated specifications on this applicator are available. If you will let me know, I will be happy to send them to you.

I realize that we are under sttack from many elements of the population in the use of certain insecticides. Surface application of Thimet worries me, although I feel that application to individual trees is safer ecologically than broadcast applications. I do know of one instance where phorate content of a nearby stream has caused concern.

If we are to continue to use toxic materials, we must be increasingly cognizant of the possible dangers to our personnel and the population in general. For this reason, we are becoming more interested in treatment through injection into the soil. We expect to be studying equipment for this purpose. Perhaps, we can even use systemics in the nurseries with properly developed, safe injection equipment.